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ABSTRACT

The traditional approach to education in zoo settings operated under the premise that meaningful learning and improved attitudes toward environmental education would occur by simply exposing children to wild animals. This study was a preliminary evaluation of an innovative environmental education program at a medium-sized Florida zoo. The study explored the extent to which one of the programs, the Tots program, facilitated the learning of basic environmental education and awareness among preschoolers. The goal of the Tots program is to provide interactive, hands-on learning opportunities for preschoolers in the zoo environment while building child-adult relationships; a mandatory feature of the Tots program is the presence and involvement of parents/guardians during all activities. Activities included circle time, crafts, time in an investigative playroom, and zoo exhibit visits. Observation of the program's activities, along with interviews of the stakeholders, revealed that the Tots program allowed the children to develop knowledge about animals and environmental awareness in a safe environment while fostering the development of social skills. (Contains 25 references.) (Author/HTH)

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Zoo School for Preschoolers: Laying the Foundation for Environmental Education

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Abstract

The traditional approach to education in zoo settings operated under the premise that meaningful learning, and improved attitudes toward environmental education would occur by simply exposing children to wild animals. The purpose of this research was to conduct a preliminary evaluation of an innovative environmental education program at a medium-sized zoo. Specifically, we explored the extent to which one of the programs, the Tots program facilitated the learning of basic environmental education and awareness among pre-schoolers. Observation of the enactment of the program's activities and interviews of the stakeholders revealed that the Tots program allowed the children to develop knowledge about animals and environmental awareness in a safe environment while fostering the development of social skills.

Zoo School for Preschoolers: Laying the Foundation for Environmental Education

Traditionally, zoos have emphasized the importance of recreation and aesthetics over education (Morgan, 2000). Primarily seeking to educate people about animals, Kellert (1979) reported that zoos were used as places to educate children 36% of the time. Later Wolf and Tymitz (1981) found that visitors 'loved' zoo animals and therefore used zoo visits as occasions to teach their children about nature. Although most zoos have education programs for students, many rely on volunteers who are not formal educators to give tours and conduct zoo education programs. These programs are usually organized around fieldtrips. The approaches to education in zoo settings usually operate under the premise that meaningful learning and improved attitudes toward wildlife conservation occur by simply exposing children to wild animals. Today, the need for effective conservation education is much more pressing. According to Carr (2002), the desire to understand animals has been joined by the need to conserve their populations and ecosystems. Zoos have responded by forming special partnerships with schools or school districts. This has led to an increase in the number of zoos offering environmental education programs and the evolution of a new organized entity often referred to as "zoo school."

The purpose of this research was to conduct a preliminary description and evaluation of an innovative environmental education program at a medium-sized zoo in south central Florida. Specifically, this study explored the extent to which one of the programs at the zoo school, the Tots program, facilitated the development of environmental awareness and understanding of basic environmental concepts among pre-schoolers.

Background

Support for environmental education at the early childhood level is based on two major premises outlined by Wilson (1993). One focuses on conservation of the natural world and the other emphasizes the healthy development of the child. Wilson (1993) contends that the primary goals of early childhood environmental education programs should be the development of a sense of wonder and appreciation for the beauty and mystery of the natural world and a respect for other creatures.

Zoo Schools

The concept of a zoo-based school or zoo school is relatively new. Most existing zoo schools are housed in large zoos, such as the Cincinnati Zoo, and usually involve middle and high school students. These grade 6-12 zoo schools usually provide alternative school experiences for at-risk youth or serve as environmental studies magnet programs. Recently, some zoo school programs have been expanded to include a focus on younger students (Herschel, 1999).

In the typical zoo school, zoo educators work directly with school personnel to align the zoo-based curriculum to local, state, and national standards and requirements. Zoo school educators emphasize aspects of the traditional, formal school curriculum, such as science, math, and language arts content knowledge, skills, and attitudes but use zoo-related concepts and resources as the context for implementation of the curriculum. In many zoo schools, especially those targeting pre-school or elementary school students, attendance is voluntary and assessment of outcomes is not mandatory. Such programs are often labeled "non-formal" because they proceed in a planned but highly adaptable

way in institutions, organizations and situations outside the sphere of formal schooling (Tamir, 1991).

Reports indicate that middle and high school students involved in zoo schools utilize the zoo as a living classroom/laboratory (Herschel, 1999). According to Herschel (1999), they take care of the zoo education departments' live animal collections, design web pages, teach elementary children, and discover the tremendous influence humans have on the welfare of animals. Not surprisingly, zoo school educators consider the physical, social and personal contexts in which learning occurs and recognize that zoos offer a highly stimulating and novel physical and social environment for meaningful science learning (Anderson, Lucas, & Ginns, 2002; Rennie & McClafferty, 1996).

Although many zoos are developing zoo schools to complement their existing field trip-based educational programs, little research has been conducted regarding their structure, history, goals, and effectiveness. This current study contributes to the much-needed body of literature investigating zoo schools and their educational impacts.

Learning Theory

Constructivism, a set of assumptions and beliefs about children and how they learn, has become an important referent for teaching and learning (Brooks & Brooks, 1993; Chaille & Britain, 2003; Geelan, 1997; Tobin & Tippins, 1993). From a constructivist perspective, learners are knowing beings who construct knowledge that is personally meaningful and is a result of active involvement (Dana & Davis, 1993; Shapiro, 1994). Contemporary research confirms the view that young children learn most efficiently when they are engaged in interaction with objects, other human beings, and their environment rather than participating in receptive or passive activities (Katz, 1987).

The range of interactions that can occur with adults, peers, materials, and surroundings allows learners to make sense of their own experiences, and in the process provides opportunities for them to connect with the natural environment around them— primarily through their senses and motor manipulation as they construct their own understanding.

Young children learn through play and through interaction with people and objects in their environment (Wilson, 1998). As social beings, children need warm and supportive relationships to not only develop positive social skills, but also because these social interactions actively contribute to children's theory building (Chaille & Britain, 2003). When children have opportunities to interact with other children, they are exposed to different ways of seeing the world.

Central Florida's Zoo School

The zoo school in south central Florida emerged as an innovative, non-formal (Tamir, 1991) educational program operating at a mid-sized zoo in a large urban area. The buildings housing the zoo school are within easy walking distance to all of the zoo's exhibits and facilities. A walkway protected by metal fencing leads directly from the zoo school to the zoo. The zoo school adopted a market-based educational philosophy with the goals of creating a learning environment that promotes basic knowledge and the development of positive attitudes about the environment and wildlife. The zoo educators work with resident scientists and local school districts to create curricula that address local and state-mandated subject matter standards. The zoo school offers a variety of programs and activities catering to individuals from age 2 to adulthood, including organized school visits and collaborative field trips to environmental sites in the community. The programs are organized for tots (preschoolers), youth, adults, and

families. This paper summarizes the results of a preliminary evaluation conducted to determine the effectiveness of one of the zoo school's innovative programs, the Tots Program, targeting preschoolers.

The Tots Program

The goal of the Tots Program is to provide interactive, hands-on learning opportunities for pre-schoolers in the zoo environment while building child-adult relationships. This program is guided by the notion that early childhood is a crucial time for the construction of knowledge, attitudes, and conceptual schema necessary for future transfer and integration of environmental science knowledge (Chaille, & Britain, 1997; Hildebrand & Hearron, 1999). The Tots Program contains several different components, including: circle time, craft time, investigative play, and a walk to the zoo. Daily activities last for a total of 90 minutes and incorporate environmental themes including animals and their habitats.

A mandatory feature of the Tots Program is the presence and involvement of parents/guardians during all of activities. This requirement is unique, and provides opportunities for parents to not only maintain discipline and order, but also to learn and reinforce basic environmental awareness and concepts to which their children are exposed. This provides a framework outside the environment of the Tots Program from which continued dialogue and support for further learning can occur between parents and children.

Study Design and Data Sources

Because the concept of a zoo school for preschoolers is relatively new, there is very little research available regarding the best way to structure programs, curricula, and

learning experiences. This study evaluated the extent to which the Tots program facilitated learning among 2-4 year olds. To develop an understanding of the program's impacts, a qualitative case study methodology was used (Merriam, 1998). Data collection began when two interviews were conducted with the curator of the zoo's educational programs to identify and understand the various components of the program, to determine the goals of the investigative process, and to establish the protocol for handling the findings. We were invited to make observations as needed with the understanding that there would be full participation by all involved. However, we were not allowed to interview participating children and parents/guardians were only interviewed if they volunteered to participate.

During site visits, we observed the full implementation of the Tots program as conducted by two instructors. During the first visit, detailed field notes were recorded by two observers and focused on the adult-child, child-child, and adult-adult interactions observed in the zoo school classroom, playroom, and zoo exhibit visits. Additionally, structured and open-ended interviews of the educational program coordinator, curriculum specialist, two instructors, and selected parents were also conducted. Written notes of all interview responses were recorded. The field note and interview data were the primary data sources used in this study.

Data Analysis

Data analysis began immediately after the first visit and used the constant comparison method as described by Taylor and Bogdan (1984). The data collected were examined repeatedly to discover themes and patterns and sorted into categories. Specifically, each researcher independently read and reviewed her field notes to get an

impression and sense of the evidence of learning, levels of interaction, and pedagogical strategies employed by the instructors. This resulted in the subsequent development of an observation chart that was used as a secondary data source to complement the field note data during our other visits. The observation chart was used to note specific interactions between individuals and among all participants, along with the timing of interactions. It also documented the interactions with manipulatives that were provided by the instructors during circle time and in the playroom.

Both observers maintained a running log of observations made and carefully recorded: specific conversations between children, questions asked by the instructors, and questions asked by the children. Of particular interest were the instructors' pedagogical approaches, levels of interactions with the children, and attempts to assess the level of learning that was occurring. Other data sources included documents related to the Tots program, such as brochures and curricular materials.

Consistent with recommended approaches to educational evaluation outlined by Guba and Lincoln (1989), as educational issues emerged, they were discussed with the coordinator and the curriculum developer. During these conversations, areas of strength and weakness were identified and attempts were made to alter the program to foster greater learning. According to Guba and Lincoln (1989), such dialogue between stakeholders and researchers not only lends itself to trustworthiness but also satisfies one of the goals of the evaluative process—program improvement.

Data sources were analyzed to identify statements and events related to the purpose of the study. Interview transcripts and field note data were studied closely to determine the extent to which certain patterns of interaction or events repeated

themselves and stood out. Special attention was paid to the type and quality of children's verbal responses to instructors and parents, children's actions, and the level of learning as indicated by specific vocabulary use or other signs indicative of environmental awareness or conceptual understanding. Assertions were constructed based on patterns of occurrence and the level of support afforded by the data. In analyzing the effectiveness of the Tots program, a large part involved examination of level of dialogue among the children as we observed complemented by the confirming data gleaned from interviews with parents and instructors.

Results

Circle Time

The daily activities began in the classroom with circle time. The classroom consisted of four clusters, each with a table seating four or five students. One side of the room was all windows, which allowed for maximum natural lighting; hence the room was brightly lit. One of the walls contained a board covered with pictures of a variety of animals as well as space for writing. This signified the front of the classroom. Other walls were adorned with pictures and a measuring tape for recording the height of the children.

During circle time, the children all faced the decorated display board with the instructor in the front. Parents were situated outside the semicircle at worktables. The parents not only listened to the instructor but also helped focus the children's attention to the instructor. Each day, circle time was conducted in the same basic format. The instructor used live animals along with large colorful pictures and engaged children in conversations about their observations. This was a traditional classroom interaction in

which the instructor introduced the children and the adults to information about selected animals. Each day, one animal was chosen as a theme, which formed the basis for the day's other activities. The children sat in a semicircle on mats on the floor and, for about 10 minutes using direct instruction supported by pictures and real animals, the instructor described the theme animal's patterns of behavior, basic body parts, and the habitat conditions needed for its survival. The children learned to recognize animals and to associate words such as shell, hair, and fur as body coverings and the functions of body parts such as eyes, feet, beaks and wings. They were also introduced to the importance and value of caring for animals and treating them kindly.

As an example, while learning about the gopher tortoise, children were guided to use the words 'hard' and 'soft' to describe the shell as they gently used two fingers for observation. Repetition of the new words was encouraged and the children responded to cues from the instructor. They also learned that the tortoise lives in burrows underground that serve as homes for many other animals. The children were also directed and supported as they articulated physical features of the animals, how to care for them, their homes, and what they eat. After handling a gopher tortoise, the issues of cleanliness and safety were introduced. Using questions, the instructor elicited from the children the importance of washing their hands after handling live animals. Based on the children's chorus responses, it was clear they grasped the importance of washing their hands.

Craft Time

Craft time began with the instructor distributing materials and supplies to the worktables as the children took their places with their parents. During craft time, parents worked with their children to create the "animal of the day" from materials provided.

The parents were given written instructions and, with the children, under the guidance of the instructor, they constructed a model of the day's animal. Different levels of parent involvement were observed during craft activities. Some parents took a hands-off approach, allowing children to choose colors and materials and even assemble the parts while following their parent's verbal directions and cues. Other parents completed the tasks themselves while the children played with various pieces. In all cases, however, the finished product became the center of attraction for all of the children as they assumed ownership. Once complete, the children squeezed, pushed and clutched their model animal, showing a level of emotional attachment. This observed and reported behavior is consistent with the conclusion of Wilson (1996) that young children tend to develop an emotional attachment to what is familiar and comfortable to them.

During the craft activity, parents were heard encouraging and guiding their children. For example while making a snake, the following conversation was recorded:

> Parent: "What size beads should we use for the eyes?"
> Child: "Blue, this one, this one." As he picked the color from the little container, he took out beads of two different sizes.
> Parent: "Will your snake have two different size eyes?" The child did not respond but attempted to stick the beads onto the body of the snake as the parent was holding it.
> Parent: "Shouldn't we have the same eyes?" (Pause and no response by the child) "I give up," she said and attached the eyes using the glue.

In another craft activity, the parent and the child could not agree on the positioning of the eyes of the owl. In this interaction, the parent gave the directions and allowed the child to handle the materials. The child pasted the circular eyes to the brown paper bag representing the owl's body. However, the second eye was placed lower than the first. The mother attempted to replace the eyes but the child was overheard insisting that it should not be removed. Immediately following this observation, the parent explained

that, at this stage of her child's development, she was satisfied that he knew to place two eyes on the owl. She was not concerned about the position of the eyes. "This will come later," she said.

As the children and parents became involved in discussions while constructing their animals, they conversed about animals and environmental issues, automatically reinforcing some of the ideas introduced during circle time. Many parents indicated that all the animals made during craft time were still on display at their homes and that the children continued to show a great deal of attachment to them. Craft time ended with the children clearing their tables, placing unused materials into selected trash containers, and enjoying a snack and a drink. After snack, the group moved to an adjoining room called the playroom.

The Investigative Playroom

The investigative playroom provided a welcoming and comfortable environment organized with childproof materials and furniture. A range of play equipment was available, including different toy animals, writing and drawing materials, animal posters, Playdough®, art and craft materials and tools, a "theme of the week" corner, and a rice box area. Supporting posters adorned the walls of the playroom. The toys, books, and games provided were also directly related to the weekly theme, despite the presence of other materials and decorations from previous sessions and other topics.

In the investigative playroom, the children played freely with toys and a variety of games that embodied environmental themes. The highly stimulating and novel physical and social environment of the investigative playroom allowed for manipulation, fun, and the development of social skills. For example, the children were observed using

templates and Playdough® to create animals of varying shapes, sizes and colors. Vygotsky (1967) noted that children are endowed with the competency to pull meanings from objects during play. In offering support, Katz (1987) mentioned that observation and interaction arising from activities such as play provide a context for social and cognitive learning. In such events, play reveals important elements of children's ability to make sense of their environment, of their linguistic, cognitive, and social skills, and of their general personal development (Slavin, 1986). Our observations confirmed this process of children identifying with their surroundings while utilizing various skill sets and undergoing personal development.

Through the manipulation of animals made from a variety of childproof materials, the children were heard naming the animals and talking about various body parts. Parents questioned their children about the names of the animals and ways of caring for them. The conversations in the playroom served to reinforce newly-acquired knowledge about animals, while also promoting environmental awareness. For example in putting together a jigsaw puzzle, environmental issues such as cutting down trees and throwing garbage into the river became part of their conversations. The interactions also fostered the development and practice of language skills in meaningful contexts as the children were encouraged to talk about common observable features of animals. For example, they were encouraged to find the animals in the rice box, and to show and tell someone else the name of the animals. This was done aloud, and usually other children responded by repeating the name or attempting to get into the rice box.

Children learn about the "do's and don'ts" of the social world from their parents, teachers, and peers (Bukalko & Daehler, 1995). The encouragement of such positive

social skills was an important facet of learning in the playroom. Both parents and the instructor observed and guided the children to more positive social behaviors when the need arose. For example, we observed one child controlling all the dinosaurs for what was considered a long time. Another child stood by wanting to share but was prevented because of the position of the other child. Encouraged by one of the parents, both children were able to share. While the parents observed and acted as safety marshals, the children were encouraged to talk, share, and learn from and with their peers.

Zoo Exhibit Visit

A fieldtrip to the zoo was the culminating activity in the Tots program. The group walked to the zoo and was involved in a variety of conversations. Quite noticeably, none of the conversation was related to any observation along the route to the zoo or the environmental themes addressed in previous activities. At the zoo, the children observed the animal of the day in its exhibit. Exhibits replicated each animal's natural environment as closely as possible. The instructor directed conversations toward the natural environment and ensured that all children had opportunities to view the animal. Some animals, such as the gopher tortoise, were difficult for the children to observe because of its size, color, and/or behavior. At the end of each day's program, the children left with "homework" related to the day's activities. This homework generally consisted of a coloring task or simply tracing an illustration of the animal.

Discussion

The Tots program seeks to provide science/environmental learning experiences for 2-4 year olds in unique formal and informal settings. This innovative program has many strengths as articulated by parents and observed in the actions of the children. The

Tots program allows children to develop environmental awareness and knowledge about animals in a safe yet novel environment while also fostering the development of social skills. Parents' feedback about the program reveals that children participating in the program become fascinated about the environment and animals. During observations, the children demonstrated a heightened awareness of environmental issues such as recycling and became engaged in conversations about animals even when away from the zoo environment.

The daily activities of the Tots program allow children to develop conceptual knowledge as they interact with their peers, parents, and the instructor, and with related teaching and learning materials. Continuous dialogue enhances their language development as children learn scientific vocabulary related to the day's topic. The children used words such as 'habitats' when relating to the homes of the animals and 'recycling' when referring to the placement of garbage in containers. These conversations not only introduce young learners to scientific vocabulary but also facilitate the improvement of their language skills. For example, students in the Tots program were able to articulate the names of animals such as snake, gopher tortoise, turtle, owl, tiger, and grasshopper, and repeat information about these animals.

The Tots program facilitates the development of behavior patterns important in formal classroom settings such as sitting and listening to an authority, and social skills necessary to operate as a functioning member of a group. Our findings indicate that children not only learn and recognize animals at the zoo school but also start to recognize and distinguish animals outside the zoo. One parent told us her son found a worm at his neighborhood playground and was able to recognize and articulate differences between

the worms he had learned about in the Tots program. This demonstrates that children in the Tots program are beginning to observe their surroundings more carefully and are developing skills for recognizing similarities and differences. Thus, the program encourages environmental awareness. During observations, the children placed garbage into respective containers based on the concept of recycling. Although pre-schoolers are usually not familiar with recycling or environmental issues, the children in the Tots program were observed putting the plastic cups into the plastic recycling box in the corner of the classroom after they drank their juice. Later, when they needed to clean their tables after the craft activity, they put all unused materials into the trash box. This indicates that the Tots program encourages positive environmental behavior.

While circle time affords structure, the playroom enables total self-initiated action. The materials and resources in the playroom provide children with opportunities to engage in sensory and motor activities as they explore models, games, and toys that are related to their environment and are consistent with the themes espoused in the zoo school curriculum. Their learning is further facilitated as they actively explore and interact with the hands-on learning resources available rather than passively listening and watching (Wilson, 1996).

Implications

Science educators are becoming increasingly aware of the complex and varying theories that children develop about their world. They argue that young children attempt theory-building through experiences that include authentic inquiry (Chaille & Britain, 2003; Metz, 1995). If young learners are to develop heightened environmental awareness, they need access to frequent, meaningful learning experiences in the outdoors

(Wilson, 1993). The zoo school provides authentic experiences for children and allows them to develop a greater awareness of, and understanding of, the environment and its inhabitants. Zoo school experiences have the potential to play a significant role in conservation education.

Young children, as social beings, construct an understanding of their social world as they interact with others (Chaille, & Britain, 1997; Hildebrand, & Hearron, 1999). Our findings suggest that the zoo school, and the Tots program in particular, can serve as a catalyst for fostering the cognitive, affective, and aesthetic development of preschoolers. The zoo school provides an educational setting and a context that encourages, permits, and facilitates the construction of knowledge about animals and the development of environmental awareness.

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Send this form to the following ERIC Clearinghouse:

ERIC Clearinghouse on Assessment and Evaluation
University of Maryland, College Park
1129 Shriver Lab
College Park, MD 20742